

Applications of Tip-Enhanced Raman Spectroscopy for Nanoscale Chemical Imaging

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Tip-enhanced Raman Spectroscopy (TERS), introduced in the year 2000, is a nanoscale chemical analysis and imaging method with a spatial resolution down to a few nm, even at ambient conditions [1]. TERS relies on the enhancement of the local electromagnetic field by a plasmonic metal nanostructure that is scanned over the sample by means of a scanning probe microscope, using either AFM or STM feedback. Analogous to SERS, the local electromagnetic field of Raman scattered light is enhanced by many orders of magnitude in TERS. In this fashion, TERS is a variant of scanning probe microscopy that provides localized chemical information.

The working principle, experimental realization, and capabilities of TERS will be introduced [1], with special emphasis on how to avoid artifacts and how to best define the spatial resolution [2].

We will then discuss recent applications of TERS to the spatially resolved chemical analysis and imaging of molecular systems. Examples from recent TERS studies in our laboratory will be chosen, focusing on catalysis [3], biological membranes [4], and the nanostructure of photovoltaic cells [5].

References

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